

Design Element				Manual Section	2-Lane			Multi-Lane	
Design Controls	Design Year Traffic		AADT	40-2.01	< 400	400 ≤ AADT < 2000	≥ 2000	**Undivided	Divided
	Design Forecast Year			40-2.02	20 Years			20 Years	
	*Design Speed (km/h) (1)			40-3.0	Level: 100-110; Rolling: 80-100			100	110
	Access Control			40-5.0	Partial Control / None			Partial Control / None	
	Level of Service			40-2.0	Desirable: B; Minimum: C			Desirable: B; Minimum: C	
Cross Section Elements**	Travel Lane	*Width		45-1.01	3.6 m			3.6 m	
		Typical Surface Type (2)		Chp. 52	Asphalt / Concrete			Asphalt / Concrete	
	Shoulder (3)	Width Usable		45-1.02	1.8 m	2.4 m	3.3 m (3b)	3.3 m (3b)	Right: 3.3 m (3b) Left: 1.2 m (3e)
		*Width Paved		45-1.02	1.2 m	1.8 m	3.0 m (3b)	3.0 m (3b)	Right: 3.0 m (3b) Left: 1.2 m (3e)
		Typical Surface Type (2)		Chp. 52	Asphalt / Concrete			Asphalt / Concrete	
	Cross Slope	*Travel Lane (4)		45-1.01	2%			2%	
		Shoulder		45-1.02	4%			4%	
	Auxiliary Lanes	Lane Width (5)		45-1.03	Desirable: 3.6 m; Minimum: 3.3 m			Desirable: 3.6 m; Minimum: 3.3 m	
		Shoulder Width (6)			Same as Next to Travel Lane			Same as Next to Travel Lane	
	Median Width			45-2.0	N/A			0.0 m	Desirable: 25.0 m Minimum: 4.8 m (7)
	Clear Zone			49-2.0	(8)			(8)	
	Side Slopes (9)	Cut	Foreslope	45-3.0	6:1 (10)			6:1 (10)	
			Ditch Width		1.2 m (11)			1.2 m (11)	
			Backslope		4:1 for 6.0 m; 3:1 Max. to Top (12)			4:1 for 6.0 m; 3:1 Max. to Top (12)	
		Fill		45-3.0	6:1 to Clear Zone; 3:1 Max. to Toe			6:1 to Clear Zone; 3:1 Max. to Toe	
	Median Slopes			45-2.02	N/A			Desirable: 8:1; Maximum: 5:1	
Bridges***	New and Reconstructed Bridges	*Structural Capacity		Chp. 60	HS-20 (13)				
		*Clear Roadway Width(14)		45-4.01	Full Paved Approach Width				
	Existing Bridges to Remain in Place	*Structural Capacity		Chp. 60	HS-20				
		*Clear Roadway Width		45-4.01	Travelway Plus 0.6 m on Each Side				
	*Vertical Clearance (Arterial Under)	New and Replaced Overpassing Bridges (15)		44-4.0	5.05 m				
		Existing Overpassing Bridges			4.30 m				
		Sign Truss / Pedestrian Bridges (15)			New: 5.35 m; Existing: 5.20 m				
	Vertical Clearance (Arterial Over Railroad) (16)			Chp. 69	7.00 m				

* Controlling design criteria (see Section 40-8.0). ** All multi-lane arterials on new locations should be designed as Divided.

*** Selection of the cross section and bridge elements is based on the design year traffic volumes irrespective of the design speed.

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIALS
(New Construction / Reconstruction)

Table 53-2

Design Element			Manual Section	Rural Arterial			
Alignment Elements	Design Speed		---	80 km/h	90 km/h	100 km/h	110 km/h
	*Stopping Sight Distance		42-1.0	130 m	160	185 m	220 m
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	230 m	270	315 m	330 m
		Stop Maneuver		140 m	170 m	200 m	235 m
	Passing Sight Distance		42-3.0	540 m	615 m	670 m	730 m
	Intersection Sight Distance		46-10.0	170 m	190 m	210 m	230 m
	*Minimum Radii (e=8%)		43-2.0	230 m	305 m	395 m	505 m
	*Superelevation Rate		43-3.0	emax = 8% (17)			
	*Horizontal Sight Distance		43-4.0	(18)			
	*Vertical Curvature (K-values)	Crest	44-3.0	26	39	52	74
		Sag		30	38	45	55
	*Maximum Grade (19)	Level	44-1.02	4%	3.5%	3%	3%
Rolling		5%		4.5%	4%	4%	
Minimum Grade			44-1.03	Desirable: 0.5%; Minimum: 0.0%			

* Controlling design criteria (see Section 40-8.0).

These standards are for use on all Rural Arterials including those on the National Highway System. They are to be used for all projects that are classified as new construction/reconstruction regardless of funding source. Therefore, all new construction/reconstruction work, whether Federal-aid funded or not, must meet these standards. Deviations from controlling design criteria should be covered by an approved design exception.

Design exception requests for Level One design criteria on:

- Non-Exempt FHWA Funded Projects on the Interstate system require FHWA approval.
- Exempt FHWA Funded Projects on the Interstate system require Chief, Division of Design approval.
- Non-FHWA Federally Funded Projects on the Interstate system require Chief, Division of Design approval with an information copy sent to FHWA.
- Projects not on the Interstate system require Chief, Division of Design approval.

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIALS

(New Construction / Reconstruction)

Table 53-2 (Continued)

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIALS

(New Construction/Reconstruction)

Footnotes to Table 53-2

- (1) Design Speed. The minimum design speed should equal the minimum value from the table or the anticipated posted speed limit after construction, whichever is greater. The state legal limit is 90 km/h on non-posted highways.
- (2) Surface Type. The pavement type selection will be determined by the INDOT Pavement Design Engineer.
- (3) Shoulder. The following will apply:
 - a. See Section 45-8.0 for additional shoulder design details.
 - b. On reconstruction projects, the usable shoulder width may be 3.0 m, and the paved width may be 2.4 m.
 - c. The shoulder is paved to the face of guardrail. The desirable guardrail offset is 0.6 m from the effective usable shoulder width. See Section 49-5.0 for more information.
 - d. Usable shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
 - e. If there are three or more lanes in each direction, a full-width shoulder, 3.3 m usable and 3.0 m paved, is required.
- (4) Cross Slope (Travel Lanes). Cross slopes of 1.5% are acceptable on existing bridges to remain in place. Where three or more lanes are sloped in the same direction, each successive pair of lanes may have an increased sideslope.
- (5) Auxiliary Lane (Lane Widths). Truck climbing lanes will be 3.6 m.
- (6) Auxiliary Lane (Shoulder Widths). At a minimum, a 0.6-m shoulder may be used adjacent to auxiliary lanes. At a minimum, shoulders adjacent to truck climbing lanes will be 1.2 m.
- (7) Median Width (Flush). Values in the table are for new construction. Medians of less than 7.5 m should be avoided at intersections. Median widths of more than 18 m are undesirable at signalized intersections, or intersections that may become signalized in the foreseeable future. On reconstruction projects, the minimum flush median width is 4.2 m for roadways with left-turn lanes and 6.6 m for roadways with concrete median barrier.
- (8) Clear Zone. The clear zone will vary according to design speed, traffic volumes, side slopes and horizontal curvature. See Section 49-2.0.
- (9) Side Slopes. Values in the tables are for new construction. See Section 45-3.0 and Section 45-8.0 for more information. For reconstruction projects, see Section 49-3.0.
- (10) Foreslope. See the Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.
- (11) Ditch Widths. In rock cuts, a “V” ditch should be used. See Section 45-8.0.
- (12) Backslopes. Backslopes for rock cuts will vary according to the height of the cut and geotechnical factors. See Section 45-8.0 for typical rock cut sections.
- (13) Structural Capacity (New and Reconstructed Bridges). The following will apply:

- a. All bridges on facilities with greater than 600 trucks per day should be checked using the Alternate Military loading.
- b. All State highway bridges within 25 km of a Toll Road Gate must be designed for Toll Road Loading.
- b. All bridges on “Extra Heavy Duty Highways” must be designed for the Michigan Train truck loading configuration.
- d. See Chapter Sixty for additional information on the loading configurations.

- (14) Width (New and Reconstructed Bridges). See Section 59-1.0 for more information on bridge widths.
- (15) Vertical Clearance (Arterial Under). Table values include an additional 150-mm allowance for future pavement overlays. Vertical clearances apply from usable edge to usable edge of shoulders.
- (16) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearances under highways.
- (17) Superelevation Rate. See Section 43-3.0 for values of superelevation based on design speed and radii.
- (18) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance which applies at the site. In some cases, the SSD values for trucks will apply. See the discussion in Section 43-4.0.
- (19) Maximum Grades. Grades 1% steeper may be used for one-way downgrades.